Absorptive Lenses

IT HAS BEEN ESTIMATED that 200 million Americans use sunglasses either for cosmetic appearance or in an attempt to increase their vision. Certainly, people who have had surgical operation for cataracts and therefore no longer have the natural barrier to radiation, particularly to ultraviolet, can greatly benefit from absorptive lenses. But does an average person really see better with sunglasses? This is a complicated question and depends on many factors, the most important of which is the general level of illumination. In dim light, such as evening or indoors, visual acuity improves with increasing illumination. Sunglasses, by reducing general illumination, also reduce visual acuity. The argument that they reduce glare of headlights when driving has been disproven by studies showing that the decreased vision predominates over the glare reduction.

In moderate illumination, sunglasses generally neither increase nor decrease vision. When illumination is high, however, results of studies are not clear-cut, but generally suggest that sunglasses improve performance of some visual tasks. One definite beneficial effect of absorptive lenses is on dark adaptation. This process is dependent on the intensity and duration of the preadaptation stimulus; thus sunglasses worn at the beach during the sunny day will allow better visual sensitivity when driving home (without wearing them) in the evening.

Sunglasses also influence color vision; this is a negligible factor with neutral gray lenses and increases with other colored lenses, particularly yellow. The effect is most pronounced for patients who are already color defective in whom it can severely impair their already compromised hue discrimination. This may present a danger to color-deficient persons because of poor recognition of traffic signals. Another potential hazard of sunglasses is in the use of polarizing lenses. The plastic sheet polarizers intended for polarizing visible light are inefficient in the near infrared spectrum and it has been observed that, although glare will be removed from reflected images of the sun by such polarizers, infrared rays will not be absorbed and therefore could be hazardous.

Finally, a new type of phototropic glass has recently attracted considerable attention. This contains silver compounds which darken upon exposure to ultraviolet light and lighten when this radiation decreases. The glass transmits ultraviolet light during the darkening phase and does not filter out the infrared spectrum at any time. The total darkening is generally insufficient for bright lights, so that an additional absorption coating must be added to the back surface of the lens to increase its overall darkening effect. These lenses tend to be expensive and react slowly, especially while lightening after the ultraviolet stimulus is removed.

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Technetium-99 Lacrimal Microscintigraphy

—A New Technique to Evaluate the Lacrimal Drainage System

IN 1972 ROSSOMONDO and co-workers described a new method of evaluating *in vivo* the lacrimal drainage system utilizing a minute quantity of technetium-99 radioactive tracer delivered as an eye drop. The progression of the radioactive tear is followed through the drainage system using a gamma camera with a micropinhole collimator. The procedure takes between 15 and 25 minutes (Figure 1). Throughout the procedure the patient

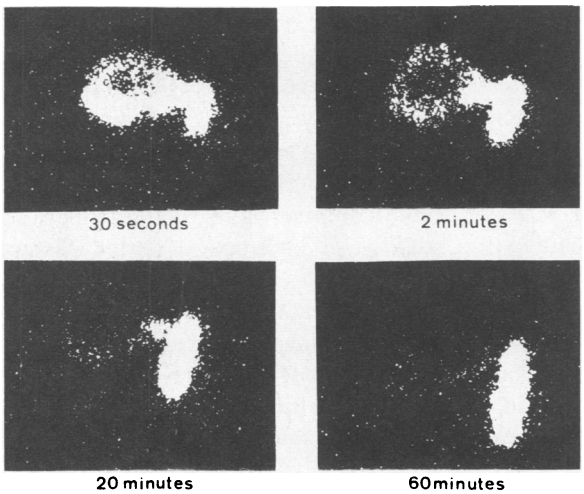

Figure 1.—Technetium-99 microscintigraphy in a normal subject. (Compliments of Dr. D. M. Maurice)

is permitted to blink freely and naturally. The method involves no catheterization and no discomfort to the patient. There is no sampling from the cul-de-sac and no cotton swabs up the nose. Since the canaliculi are not instrumented and the radioactive material is suspended in a sterile buffer normal saline solution, the natural physiologic dynamics of the drainage system are maintained. The radiation dose to the lens is approximately 4 to 6 millirads. This dose is about 2 percent of that received in a single typical anterior posterior skull roentgenogram. The test can be used to study not only pathological alterations in the tear drainage mechanism but also to study the normal physiology of tear drainage. Since the gamma camera is a widely used diagnostic tool found in more than 1,000 hospitals throughout the United States, lacrimal microscintigraphy can be available to ophthalmologists in many nuclear medicine departments.

In a recent study by Chaudhuri and associates, a comparison was made between conventional radiographic contrast dacryocystogram and the radioisotope scan of the lacrimal drainage apparatus (technetium-99 lacrimal microscintigraphy). The investigators concluded that lacrimal microscintigraphy was superior to the routine contrast dacryocystogram. They found it to be particularly useful in analysis of functional blockage; for example, in situations where the "lacrimal pump" is abnormal or in partial stenosis of the nasolacrimal duct. In both conditions the drainage system irrigates freely but does not permit the free passage of tears under normal physiological circumstances. In addition, in functional and in some anatomical blocks, the contrast dacryocystogram which employs direct catheterization of the canaliculi and injection under pressure can create a false passage or open up physiologic or anatomic blocks thus erroneously implying patency. Consequently, the lacrimal microscintigraphy technique is felt to be superior since it is done without catheterization of the canaliculi and therefore permits study of pathological obstruction under physiologic conditions.

In summary, lacrimal microscintigraphy appears to be an excellent method of studying the normal physiological tear drainage as well as tear drainage in various pathological conditions. The procedure is atraumatic and requires no catheterization of the canaliculi or the duct while delivering a small radiation dose to the lens and anterior chamber. Accurate diagnoses of both functional and anatomical blocks can be made. The normal physiology of tear drainage may be studied with the technique. Lacrimal microscintigraphy should allow accurate differentiation between hypersecretion, anatomical block and functional block in patients who complain of epiphora.

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Computer Assisted Tomography

COMPUTER ASSISTED TOMOGRAPHY (CAT), a fundamentally new technique in x-ray diagnosis, has excited widespread interest and enthusiasm since its introduction in 1973. The CAT scan depicts variations in tissue density to a degree that cannot be achieved by conventional radiography. A sodium iodide crystal rather than photographic film serves as the x-ray detector.

The technique is noninvasive and is free of discomfort and risk. The x-ray dose is less than that employed for a regular skull series. Admission to hospital is not required. During a single scanning procedure, a total of 28,800 measurements are taken. A small computer calculates the absorption values of the tissue section being scanned. Values are calculated for tissue blocks measuring 3 by 3 by 13 mm. Even higher resolution systems are now becoming available. The results are displayed on both a computer printout and on a cathode ray tube; the brightness of each block is proportional to its absorption value. The cathode tube display is photographed with a Polaroid® camera and is part of the report sent to the referring physician.

The CAT scan has proved invaluable in the diagnosis of intracranial disease. It has become a major tool for neuro-ophthalmologists investigating such problems as suspected compressive lesions causing visual loss. Not only can intracranial mass lesions be identified but also their probable nature may be determined as well by virtue of their relative density. A distorted ventricular system may provide still another clue to the presence and site of an intracranial lesion.